



U.S. Department of Transportation
Federal Aviation Administration
Standard

FACILITIES ENGINEERING DRAWING PREPARATION

Foreword

This standard has adopted the nationally accepted drawing practices of the American National Standards Institute (ANSI) and the military to the extent specified herein. It will assist in developing a more efficient and effective means for management and technical data control of drawings prepared for the Federal Aviation Administration (FAA) National Airspace System (NAS) program. This standard provides:

- a. Drawing practices for the preparation of engineering drawings and drawing format materials.
- b. Definitions and examples of the types of facilities engineering drawings to be prepared by, or for the Federal Aviation Administration.
- c. Procedures for the creation of titles for engineering drawings.
- d. Numbering, coding and identification procedures for engineering drawings, associated lists, and documents referenced on these engineering drawings and associated lists.
- e. Practices applicable to computer aided or manual drafting.

This standard does not provide preparation requirements for NAS mission equipment.

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1. SCOPE

1.1 Scope. This standard prescribes general requirements for the preparation and revision of engineering drawings and associated lists which are prepared for facilities by, or for the Federal Aviation Administration (FAA).

1.2 Classification. This standard shall apply to the following drawing types:

- a. Construction drawings
- b. Installation drawings

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2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents of the issue in effect on the date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein. In event of conflict between the documents referenced herein and the contents of this standard, the contents of this standard shall be considered a superseding requirement.

SPECIFICATIONS:

Federal

L-F-340	Film, Diazotype, Sensitized; Moist and Dry Process; Roll and Sheet
L-P-519	Plastic Sheet: Tracing, Glazed and Matte Finish

Military

MIL-D-5480	Data, Engineering and Technical; Reproduction Requirements for
MIL-M-9868	Microfilming of Engineering Documents, 35mm, Requirements for

STANDARDS:

FAA

FAA-STD-005	Preparation of Specification Documents
FAA-STD-023	Microfilming of Engineering and Electrical Drawings

Military

MIL-STD-14	Architectural Symbols
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OTHER PUBLICATIONS:

Orders

DOT Order 1360.6	Graphic Standards
FAA Order 7340.1	Contractions
FAA Order 1000.15	Glossary

Copies of government specifications, standards, drawings, and publications required by suppliers and contractors in connection with specified procurement functions should be obtained from the procuring activity or as directed by the contracting officer.

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2.2 Non-Government documents. The following documents of the issue in effect on the date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein. In event of conflict between the documents referenced herein and the contents of this standard, the contents of this standard shall be considered a superseding requirement.

STANDARDS:

ANSI

ANSI/AWS A2.4	Symbols for Welding and Nondestructive Testing
ANSI/AWS A3.0	Welding Terms and Definitions
ANSI B1.1	Unified Screw Threads
ANSI Y1.1	Abbreviations for Use on Drawings and in Text
ANSI Y14.1	Drawing Sheet Size and Format
ANSI Y14.2M	Line Conventions and Lettering
ANSI Y14.5M	Dimensioning and Tolerancing
ANSI Y14.6	Screw Thread Representation
ANSI Y14.7.1	Gear Drawing Standards-Part 1 For Spur, Helical, Double Helical and Rack
ANSI Y14.7.2	Gear and Spline Drawing Standards Part 2-Bevel and Hypoid Gears
ANSI Y14.13M	Mechanical Spring Representation
ANSI Y14.15	Electrical and Electronics Diagrams
ANSI Y14.15.a	Interconnection Diagrams
ANSI Y14.17	Fluid Power Diagrams
ANSI Y14.26.3	Dictionary of Terms for Computer-Aided Preparation of Product Definition Data (including Engineering Drawings)
ANSI Y32.2	Graphic Symbols for Electrical and Electronic Diagrams

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ANSI Y32.4	Graphic Symbols for Plumbing Fixtures for Diagrams Used in Architecture and Building Construction
ANSI Y32.9	Graphic Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction
ANSI/IEEE 91	Graphic Symbols for Logic Functions
ANSI/IEEE 200	Reference Designations for Electrical and Electronics Parts and Equipment

HANDBOOKS:

American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE)

ASHRAE Handbook: Fundamentals Volume

Copies of industry standards may be obtained from:

American National Standards Institute
1430 Broadway
New York, N.Y. 10018

Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.

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3. REQUIREMENTS

3.1 Size and format of engineering drawings. Engineering drawing sheet size and format shall be in accordance with Table I and ANSI Y14.1. Continuation sheets of multi-sheet drawings shall always be the same size as the first sheet.

Table I. Standard Drawing Sheet Sizes

Flat Sizes					Roll Sizes					
Size Designation	Width (Vertical)	Length (Horizontal)	Margin		Size Designation	Width (Vertical)	Length (Horizontal)		Margin	
			Horizontal	Vertical			Min	Max	Horizontal	Vertical
A (Horiz)	8.5	11.0	0.38	0.25	G	11.0	22.5	90.0	0.38	0.50
A (Vert)	11.0	8.5	0.25	0.38	H	28.0	44.0	143.0	0.50	0.50
B	11.0	17.0	0.38	0.62	J	34.0	55.0	176.0	0.50	0.50
C	17.0	22.0	0.75	0.50	K	40.0	55.0	143.0	0.50	0.50
D	22.0	34.0	0.50	1.00						
E	34.0	44.0	1.00	0.50						
F	28.0	40.0	0.50	0.50						

NOTE: All dimensions are in inches. 1 inch = 25.4 millimeters

3.2 Line conventions and lettering. Line conventions and lettering shall be in accordance with ANSI Y14.2M.

3.2.1 Isometric and pictorial views. Isometric pictorial views, etc., may be shown on engineering drawings provided there is some particular advantage, and when clarity is not degraded.

3.3 Dimensioning and tolerancing. Dimensioning and tolerancing shall be in accordance with ANSI Y14.5M.

3.4 Screw thread representation. Screw threads shall be represented in accordance with ANSI B1.1 and ANSI Y14.6.

3.5 Gears. Gears shall be delineated in accordance with ANSI Y14.7.1 and ANSI Y14.7.2.

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3.6 Mechanical springs. Mechanical springs shall be delineated in accordance with ANSI Y14.13M.

3.7 Computer-aided preparation of product definition data. Terms and definitions used in computer-aided preparation of product definition data as applicable to engineering drawings shall be in accordance with ANSI Y14.26.3.

3.8 Graphic symbols, designations, letter symbols and abbreviations. Graphic symbols, designations, letter symbols, and abbreviations used on engineering drawings and associated lists shall be in accordance with the following requirements: (Graphic symbols, designations, letter symbols and abbreviations that are not covered by the listed standards may be used provided they are defined by or referenced to an explanatory document.)

3.8.1 Graphic symbols.

3.8.1.1 Graphic symbols for electrical and electronic diagrams. Graphic symbols for electrical and electronic diagrams shall be in accordance with ANSI Y32.2.

3.8.1.2 Graphic symbols for logic functions. Graphic symbols for logic functions shall be in accordance with ANSI/IEEE 91.

3.8.1.3 Graphic symbols for electrical wiring and layout diagrams used in architecture and building construction. Graphic symbols for electrical wiring and layout diagrams used in architecture and building construction shall be in accordance with ANSI Y32.9.

3.8.1.4 Graphic symbols for plumbing fixtures. Graphic symbols for plumbing fixtures for diagrams used in architecture and building construction shall be in accordance with ANSI Y32.4.

3.8.1.5 Architectural symbols. Architectural symbols used on architectural and building construction drawings shall be in accordance with MIL-STD-14.

3.8.1.6 Welding symbols. Welding symbols shall be in accordance with ANSI/AWS A2.4, and with terms and definitions in accordance with ANSI/AWS A3.0.

3.8.1.7 Graphic symbols for heating, ventilation, and air conditioning. Graphic symbols for heating, ventilation, and air conditioning shall be in accordance with the Fundamentals Volume of the ASHRAE Handbook.

3.8.2 Designations.

3.8.2.1 Reference designations for electrical and electronic parts and equipments. Reference designations shall be assigned in accordance with ANSI/IEEE 200 and ANSI Y32.2.

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3.8.3 Letter symbols and abbreviations.

3.8.3.1 Abbreviations. Abbreviations shall be in accordance with FAA Orders 7340.1 and 1000.15. ANSI Y1.1 may be used when the desired abbreviations are otherwise unavailable.

3.8.3.2 Drawing title acronyms. The acronyms listed in paragraph 6.2.2 shall be used in drawing titles. Other acronyms may be selected from FAA Orders 7340.1 and 1000.15.

3.9 Diagrams.

3.9.1 Electrical and electronic diagrams. Electrical and electronic diagrams, and interconnection diagrams shall be prepared in accordance with ANSI Y14.15 and ANSI Y14.15.a.

3.9.2 Fluid power diagrams. Fluid power diagrams shall be prepared in accordance with ANSI Y14.17.

3.10 Clarity and legibility. Engineering drawings and associated lists shall be of such clarity and quality that when reproduced or microfilmed, they shall produce copies that conform to the legibility requirements of MIL-M-9868, or MIL-D-5480 as applicable.

3.11 Drawing format materials for engineering drawings and associated lists. Materials used in the preparation of drawings and associated lists shall be of the type and quality that will assure legibility and reproducibility. In addition, when retention of originals by the contractor is required, the contractor shall provide reproducible engineering drawings to serve as FAA masters. The reproducible drawings shall be direct contact photographic mylar, made from the tracing originals, using cronaflex, Kodak or equivalent, .004 inch mylar film in accordance with L-F-340 and L-P-519. Unless otherwise specified, the image shall be printed in reverse and developed in a fine line developer.

3.11.1 Drafting film. The drafting film for use in preparation of engineering drawings shall be polyester drafting film with a minimum base thickness of .003 inch in accordance with L-P-519.

3.11.2 Contractor medium samples. Contractors shall submit a sample strip of the drafting film or paper to be used with each bid for the purpose of determining its compliance with the requirements of this standard. The sample strip shall be 12 inches by the full width of the drawing sheet size to be used. The name of the supplier of the drafting medium and the manufacturer's material code shall be clearly marked on each sample.

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3.12 Microfilm requirements. Microfilm requirements shall be in accordance with FAA-STD-023.

3.13 Arrangement of drawings.

3.13.1 Arrangement of construction drawing sets. Construction drawing sets shall be arranged by discipline in the following order:

- General (Title/Index Sheet or Title Sheet and Index Sheet)
- Civil (sanitary and plot or vicinity plans)
- Architectural
- Structural
- Mechanical (plumbing, heating, ventilation, etc.)
- Electrical

NOTE: Each sheet of the construction drawing set shall have its own unique drawing number (see 3.20.2d and 3.20.2e).

3.13.2 Arrangement of installation drawings. NAS installation drawings shall cover the requirements for installation of NAS mission equipment in facilities. There may be numerous drawings which may be multiple sheet (several drawing sheets with the same drawing number). Installation drawings shall include all aspects of the installation such as structural, mechanical, electrical and electronics.

3.14 Scale. All drawings shall be drawn to scale except as described herein.

3.14.1 Indication of scale. The scale of each view or section shall be entered directly below the title of the view or section (e.g., 1/8" = 1'-0"). Views or sections having a common scale and related by a common title may have one applicable scale entry under the title. In addition to a conventional indication of scale, there shall be a graphic depiction of each scale used shown to the left of the contractor's identification block or DOT/FAA title block in bar form. The scales used for multiple views on a single drawing sheet shall be placed in sequence according to size, with the smallest at the top, and with the title "Graphic Scale(s)" placed below (see Figures 1 and 1a for full size camera ready copy suitable for reproduction and use on drawings).

3.14.2 Indication of direction. All plan views within a set of drawings shall be oriented in the same direction. In cases where this is not possible, the deviations shall be noted on the drawing. There shall be at least one north arrow (with the letter "N" at the top of the arrow) pointing up or left on each plan sheet within the drawing set. Survey and site plan drawings that contain property line bearings shall indicate the magnetic declination, isogonic value, and the date of the value.

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3.14.3 Drawings not to scale. In the case of diagrams, isometrics, perspective, tabulated, and similar drawings not prepared to any scale, the word "NONE" shall be entered after "SCALE".

3.15 Title/index sheet. All construction drawings (paragraph 3.13.1) with two or more disciplines shall include a title/index sheet, or a title sheet and an index sheet. A separate title sheet and index sheet are required when there is insufficient space for indexing the drawings of that respective set on a combined title/index sheet (see Figures 2, 3, and 4). Multi-sheet drawings (paragraph 3.13.2) shall have a listing of all sheets, with revision status of each sheet on sheet 1.

3.16 Contractor identification. All engineering drawings prepared by contractors shall bear the contractor identification block, along with the architect's/professional engineer's (PE) seal as required. This identification block shall be located adjacent to, and to the left of the DOT/FAA title block in accordance with Figure 4.

3.17 DOT/FAA mark and signature. Each title/index sheet or title sheet only, shall bear the DOT/FAA mark and signature. The DOT/FAA mark and signature shall be in accordance with DOT Order 1360.6. A full size, camera ready copy of the DOT/FAA mark and signature has been provided for photographic use (see Figures 5 and 5a).

3.18 Zoning. Vertical and horizontal zone blocks as outlined in ANSI Y14.1 shall not be used on finalized engineering drawings.

3.19 Title blocks.

3.19.1 Drawing title. The drawing title shall be the name by which the subject matter shall be known and will consist of a facility or system designator (first line), if applicable, and a basic name with sufficient modifiers to differentiate like facilities or systems. This title may be centered or left justified.

3.19.1.1 Facility designator. Facility designators may be in acronym form. If used, acronyms shall be as provided by the project technical office (see paragraph 6.2 for frequently used acronyms).

3.19.1.2 Modifiers. Titles for drawings requiring modifiers shall be in two parts. The first part shall be the facility or system designator. The second part shall be the name and any additional modifiers necessary to completely identify the subject matter.

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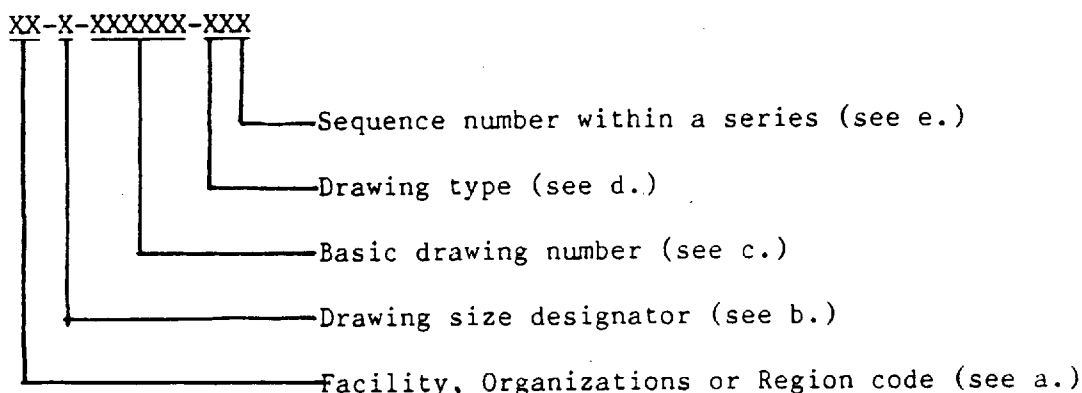
3.19.1.3 General rules.

- a. Abbreviation of portions of the name shall not be made (second part of the title) except for commonly used trademark names, and the words ASSEMBLY (ASSY), SUBASSEMBLY (SUBASSY), or INSTALLATION (INSTL). Abbreviations conforming to FAA Orders 7340.1 and 1000.15 may be used in the modifier portion of the title; however, the use of abbreviations should be avoided.
- b. A drawing title shall be brief and as simple as possible, shall describe the subject matter, and shall distinguish between similar items.

3.20 Drawing number. The drawing number shall consist of letters, numbers, or a combination of letters and numbers, which may or may not be separated by dashes. The number is assigned to a particular drawing for identification purposes.

3.20.1 Drawing number assignment. Washington Office (WO) drawing numbers for national distribution will be assigned by the Systems Engineering Service (AES). The Federal Aviation Administration Regional Offices (FAA-RO), Aeronautical Center (AAC), and Technical Center (FAATC) will assign all drawing numbers intended for their exclusive use.

3.20.2 Drawing number structure. The drawing number structure for all engineering drawings covered by this standard shall consist of a maximum of fifteen characters as shown below:



a. Code	<u>Facility, Organizations or Region</u>
AC	Aeronautical Center
AL	Alaskan Region
AS	Airport Standards
CE	Central Region

CT	FAA Technical Center
EA	Eastern Region
ES	Systems Engineering Service
GL	Great Lakes Region
NE	New England Region
NM	Northwest Mountain Region
PM	Program Engineering and Maintenance Service
SO	Southern Region
SW	Southwest Region
WP	Western Pacific Region

- b. An uppercase letter shall be used to indicate drawing sheet size, (e.g., A, B, C, D, etc.,).
- c. The basic drawing number shall be unique to each drawing or set of drawings in a single series of a Facility or Regional System.
- d. When a series of drawings are a part of a construction set (paragraph 3.13.1), the sequence number within a series shall be prefixed by an uppercase letter to identify the discipline as follows:

A - architectural	E - electrical	M - mechanical
C - civil	G - general	S - structural

NOTE: When installation drawings are developed, this digit shall be combined with the sequence number assigned in "e" below:

- e. Sequence numbers within a series of construction drawings shall be assigned a two digit numerical designator starting with "01". Sequence numbers for installation drawings shall be assigned a three digit numerical designator starting with "001".

3.20.3 Sheet sequence numbering. In order to facilitate the identification of rolled drawings, the drawing number shall be printed in the lower right and upper left margins on the back of the drawing so it is readable when the drawing is rolled up.

3.21 Title block format and location.

3.21.1 Format.

3.21.1.1 "A" and "B" size drawings. Engineering drawings in the "A" and "B" size format shall bear the title block as shown in Figure 6.

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3.21.1.2 "C" size and larger drawings. All engineering drawings in the "C" size and larger format shall bear the title block as shown in Figure 7.

3.21.2 Location. Title blocks shall be located in the lower right hand corner of all engineering drawings.

3.21.3 Camera ready copy. Full size camera ready copy title blocks have been provided for photographic use (see Figures 6 and 7).

3.21.4 Region/sector identification. The region or sector shall be identified in the title block immediately below "Federal Aviation Administration".

3.22 Title block entries.

3.22.1 ISSUED BY block. The ISSUED BY block shall indicate the organization that is responsible for issuing the drawing (see Figures 8 and 9).

3.22.2 SUBMITTED BY block. The SUBMITTED BY block shall include the office, and the representative of that office who is primarily responsible for submitting the subject drawing for approval (see Figures 8 and 9).

3.22.3 APPROVED BY block. The APPROVED BY block shall include the office, and the representative of that office who is authorized to approve the subject drawing (see Figures 8 and 9).

3.22.4 REVIEWED BY block. The REVIEWED BY block shall include the office, and the representative within that office, through whom the subject drawing has been coordinated. This representative shall be authorized to review and accept (or reject) subject drawing on the basis of its technical accuracy and completeness, and shall verify that the drawing fulfills the requirements of that office (see Figures 8 and 9).

3.22.5 Registered professional engineer. A registered professional engineer or architect shall place his certification seal on construction drawings as required by the contract. Any revision that changes the design of any structural, mechanical, electrical, or architectural feature on a drawing which bears the seal of registered professional engineer voids that seal unless the same professional engineer initials the change. If the change has been made under the auspices of another registered professional engineer, then this seal shall be affixed, certifying that the design change or modification is correct.

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3.23 Lettering of title blocks. All title block information shall be lettered in uppercase, using LeRoy or equivalent. The LeRoy size and style template shall be in accordance with Table II, and Figures 8 and 9.

Table II. Letter Size and Style

Information	A and B Size	C Size & Larger
Title	120 TEMPLATE	175 TEMPLATE
Submitted By	60 TEMPLATE	80 TEMPLATE
Approved By	60 TEMPLATE	80 TEMPLATE
Date	60 TEMPLATE	80 TEMPLATE
Drawing Number	175 TEMPLATE	200 TEMPLATE

3.24 Revision of engineering drawings.

3.24.1 Revision methods. Revisions shall be made by erasure; by the addition of information; or by redrawing.

3.24.1.1 Change in dimensions. In general, any change to a dimension of a part should also be made to scale on the affected portion of the delineation; however, it is permissible to leave the delineation unchanged when the new proportion of the part is not noticeably different from the original one. If it is impracticable to make changes to scale, the practice outlined in ANSI Y14.5M shall be followed. If the drawing is redrawn, delineation shall be made to scale.

3.24.1.2 Drawing practices. When revising an existing engineering drawing or referenced document, the most recently approved graphic symbols, designations, letter symbols, abbreviations, and drawing practices shall be used for any changes or revisions. Superseded symbology, etc., already appearing in the engineering drawing and in accordance with formerly approved standards should remain unchanged provided the interpretation is clear and unambiguous.

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3.24.2 Identifying revisions on drawings.

3.24.2.1 Revision locations. Revisions shall be identified in the revision block. The specific items changed during the revision shall be indicated on the drawing field.

3.24.2.2 Revision letters. Uppercase letters shall be used in alphabetical sequence. The letters "I", "O", "Q", "S", "X", and "Z" shall be omitted. When revisions are numerous enough to exhaust the alphabet, the revision following "Y" shall be "AA", the next "AB", then "AC", etc. Should "AA" to "AY" be exhausted, the next sequence shall be "BA", "BB", etc. Revision letters shall not exceed two characters. The first revision to a drawing shall be assigned the letter "A". The release or initial issue of a drawing does not require the use of a revision letter.

3.24.2.3 Multiple changes. All changes to a drawing that are incorporated at one time shall be identified by the same revision letter. However, if more than one revision authorization is incorporated at one time, each revision description shall be identified with its revision authorization.

3.24.2.4 Additions. When a multi-sheet drawing is revised to add a new sheet, the following note, "THIS SHEET ADDED (AUTHORIZATION IDENTIFICATION)" shall be entered in the description column of the revision block of each new sheet and the revision block of the title/index sheet.

3.24.2.5 Required revisions. Any change to a drawing shall be recorded as a revision.

3.25 Revision block. The revision block size and format shall conform to Figures 8 and 9. Each revision shall be recorded in the revision block in accordance with the following:

- a. The identifying letter pertaining to the revision shall be entered in the "REV LTR" column.
- b. A brief description of the change shall be entered in the "DESCRIPTION" column, or it shall refer to the identity (number) of the document authorizing the change.
- c. An approval signature shall be entered in the "APPROVED" column, and the date shall be entered in the "DATE" column.
- d. A signature certifying technical accuracy, contract compliance, etc., shall be entered in the "CHECKED" column.

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3.26 Revision of multiple-sheet drawings. Concurrent changes made to any or all sheets of a multiple-sheet drawing shall be identified on each sheet revised by the same revision letter. Each revision affecting any or all sheets shall be identified on the revision status block located on sheet 1 of the multiple-sheet drawing (see Figure 10).

3.26.1 Procedure. Revisions to any sheet of a drawing shall be made and recorded in the usual manner, except that the sequencing of revision letters shall apply to the drawing as a whole rather than to each individual sheet. The drawing index sheet shall include a tabulation to indicate the revision status of each sheet of the drawing. Whenever a change is made on any sheet, the applicable revision letter shall be entered in the revision status tabulation on sheet 1, regardless of whether sheet 1 is affected by the change.

3.26.2 Redrawn or replaced drawings. When a drawing is redrawn due to an engineering change, the next revision letter in sequence shall be entered in the revision block of the new drawing. The revision description of the new drawing shall contain a statement similar to the following, "REPLACES REVISION _____ WITH CHANGES". The description of the change shall be recorded in the description column, or reference shall be made to a change authorization document describing the change. All previous symbols and revision notations shall be omitted from the superseding drawing. The following notation shall be entered in the description block of the superseded drawing, "REPLACED WITH CHANGE BY REVISION _____". The next revision letter in sequence shall be entered after "REVISION". The word "SUPERSEDED" shall be stamped or printed on the old drawing in letters not less than .25 inch high, and as near to the title block as space permits. When a drawing is redrawn without a change, the revision letter of the replaced drawing shall be used, and a statement similar to the one used when replacing a drawing with a change is entered in the revision block, and the phrase "WITHOUT CHANGE" shall be used. When a new drawing number (that supersedes an old drawing number) is generated, the drawing numbers shall be cross-referenced in the description column on each of the drawings (see Figures 11 and 12).

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4. QUALITY ASSURANCE PROVISIONS

4.1 General. This section lists the requirements for the inspection and submittal of drawings, and the engineering data quality assurance system.

4.2 Responsibility for inspection. Unless otherwise specified in the contract or order, the contractor/supplier is responsible for the performance of all inspection requirements. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities that are suitable for the performance of the inspection requirements specified herein, subject to approval of the contracting officer. The contracting officer reserves the right to perform any of the inspections set forth in the specification, where such inspections are deemed necessary to assure that the engineering drawings and the associated lists conform to prescribed requirements.

4.3 Engineering data quality assurance system. Unless otherwise specified in the contract or order, the contractor/supplier shall have an effective quality assurance system for the detailed examination and review of the technical accuracy of all engineering drawings and associated lists to be supplied under the terms of the contract. The procedures of the quality assurance system shall assure the conformance of the engineering drawings and associated lists to the applicable contract provisions. The quality assurance system shall be documented, and subject to the approval of the contracting officer. The quality assurance system involves those individuals who sign off on the drawings.

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5. PREPARATION FOR DELIVERY

This section is not applicable to this standard.

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6. NOTES

6.1 General.

6.1.1 Engineering drawings. The term "engineering drawing" shall be understood to mean all of the discipline/specialty drawings of new and existing equipment and systems which house, support, and otherwise provide the physical environment for the operation of air traffic control systems and equipment. The facilities are also composed of electric, electronic, power, and environmental equipment which support the NAS mission equipment.

6.1.2 Drawing definitions. This section defines the engineering drawings normally prepared by, or for the FAA.

6.1.2.1 Application. Normally, several types of engineering drawings combined into sets with associated lists are required to completely define the end-product requirements of an item. As the complexity of an item increases, specialized engineering drawings may be required to provide a full engineering description. In certain cases, special purpose drawings may be required for management control, logistics, configuration management, manufacturing aids, and other unique functions. These shall be defined in the Contract.

6.1.2.2 Construction drawing. A construction drawing shows the design of buildings, structures, or the related construction (individually, or in groups), and are normally associated with the architectural, construction, and civil engineering (and all other engineering disciplines) operations. Construction drawings establish all the interrelated elements of an architectural-civil engineering design including the pertinent services, equipment, utilities, and other engineering details.

6.1.2.3 Elevation drawing. An elevation drawing shows the vertical projections of buildings, structures, or profiles of equipment. As applicable, an elevation drawing shows the configuration, shapes and sizes of features, walls, compartments, the assignment of space, and the location and arrangement of machinery or fixed equipment. An elevation drawing may indicate the materials of construction.

6.1.2.4 Engineering drawing. An engineering drawing is used to convey (directly or by reference) the physical and functional end-product design requirements of an item. This may be done by means of pictorial, schematic, or textual presentations.

6.1.2.5 Erection drawing. An erection drawing shows the procedural and operational sequences for the erection or assembly of individual items (or assemblies of items). An erection drawing shows the location of each part in the structure with the identification markings, fastening requirements, approximate weights of heavy structural members, controlling dimensions, assembly sequence, parts lists, torquing requirements, and any other information necessary to erect the structure.

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6.1.2.6 Plan drawing. A plan drawing is a horizontal projection of a structure, showing the layout of the foundation, floor, roof, or utility system. A plan drawing shows shapes, sizes, foundation materials, superstructure relations, elevations with reference to fixed datum planes, location of walls, partitions, openings, columns, stairs, shapes and sizes of roofs, parapet walls, drainage systems, cabling, skylights, and ventilators. A plan drawing may also specify construction materials and shall show the arrangement of structural framing. As applicable, the location of equipment or furniture shall be indicated. A plan drawing for mechanical and electrical utilities depicts the individual layouts for heating, ventilating, plumbing, fire protection, air conditioning, cable interconnect(s), electrical, electronic, and/or other utility systems.

6.1.2.7 Plot plan drawing. A plot (plat) plan drawing shows the areas of which structures are clearly indicated with detailed information regarding their relationship to other existing structures, proposed utilities, topography, boundary lines, roads, walks, and fences. A plot plan drawing shows property lines, benchmarks, monuments, local datum/coordinates, locations, contours, profiles, shrubbery, existing and new utilities, sewer and waterlines, building lines, the location of structures to be constructed, existing structures, approaches, finished grades, and other pertinent data.

6.1.2.8 Arrangement drawing. An arrangement drawing is a drawing that shows the relationship of major units of the item, in any projection or perspective drawing technique, with or without controlling dimensions.

6.1.2.9 Vicinity plan or site drawing. A vicinity plan or site drawing (or vicinity map used with construction drawings) shows the relationship of a site to features of the surrounding area, such as towns, bodies of water, bridges and load limits, truck access to site, railroads, and highways.

6.1.2.10 Wiring harness drawing. A wiring harness drawing shows the path of a group of wires that are laced together in a specified configuration to simplify installation.

6.1.2.11 Cable assembly drawing. A cable assembly drawing shows power, signal, radio frequency, or the audio frequency cables that are normally used between equipments, units, inter-racks, etc. Cable terminations are indicated as plugs, sockets, connectors, etc.

6.1.2.12 Diagrammatic drawing. A diagrammatic drawing shows the features and relationship of items forming an assembly or system, by means of symbols and lines. A diagrammatic drawing is a graphic explanation of the manner by which an installation, assembly, or system (e.g., mechanical, electrical, electronic, hydraulic, pneumatic) performs its intended function.

6.1.2.13 Terminal block diagram. A terminal block diagram shows wiring harness termination points, and interconnections between terminal blocks (strips).

6.2 Definitions

6.2.1 Acronyms and abbreviations. The following are definitions of acronyms and abbreviations used in this standard.

AAC	Aeronautical Center
AAS	Office of Airport Standards
ACT	FAA Technical Center
A/E	Architect/Engineer
A&E	Architectural and Engineering
AES	System Engineering Service
ANSI	American National Standards Institute
APM	Program Engineering and Maintenance Service
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc.
ASSY	Assembly
AWS	American Welding Society
DOT	Department of Transportation
FAA	Federal Aviation Administration
FAA-RO	Federal Aviation Administration Regional Office
IEEE	Institute of Electrical and Electronic Engineers
INSTL	Installation
MIL	Military
NAS	National Airspace System
PE	Professional Engineer
STD	Standard
SUBASSY	Subassembly
WO	Washington Office

6.2.2 Drawing title acronyms. The following acronyms shall be used for first line title entries as applicable.

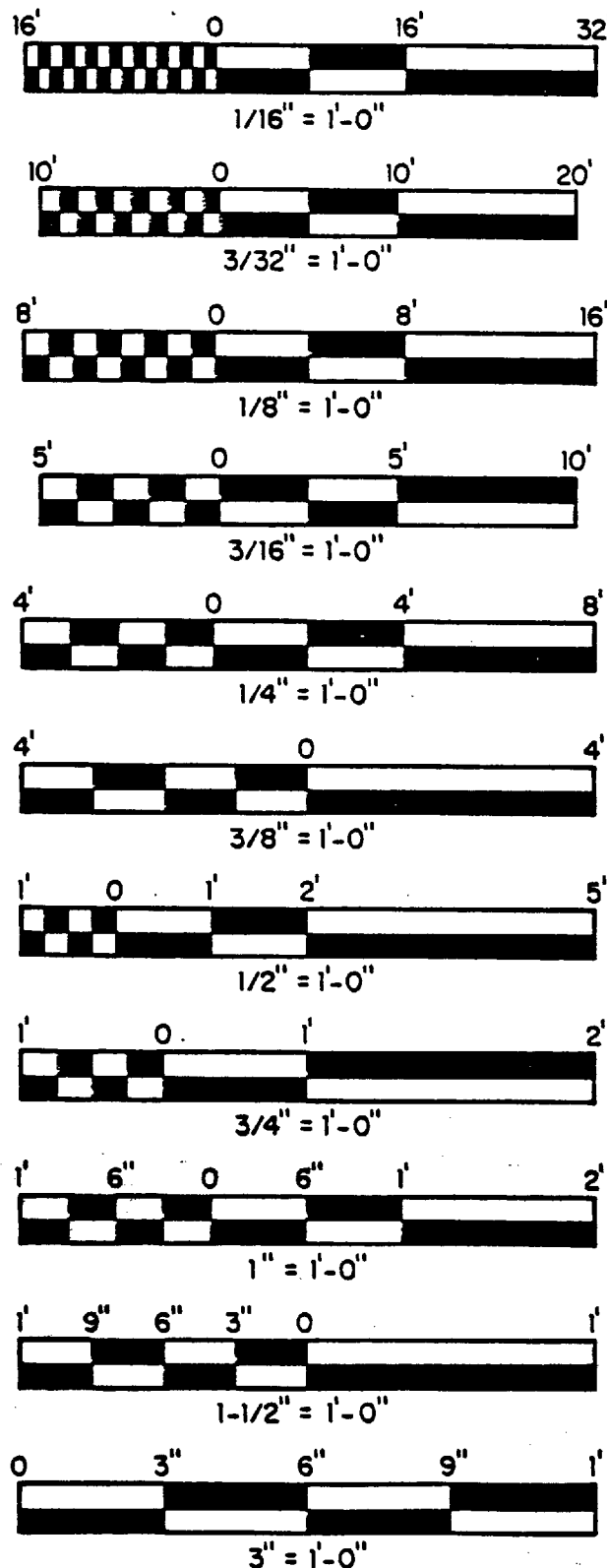
AAC	Aeronautical Center
AAL	Alaskan Region
AAP	Advanced Automation Program Office
AAS	Office of Airport Standards
ACE	Central Region
ACT	FAA Technical Center
ADF	Automatic Direction Finder
ADL	Associate Administrator for Development and Logistics
AEA	Eastern Region
AES	Systems Engineering Service
AGL	Great Lakes Region
ALS	Approach Lighting System
ALSF	Approach Lighting System with Sequenced Flashers
ANE	New England Region
ANM	Northwest Mountain Region
APM	Program Engineering and Maintenance Service
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal Systems
ASDE	Airport Surface Detection Equipment

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ASO	Southern Region
ASW	Southwest Region
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
ATCRBS	Air Traffic Control Radar Beacon System
ATCT	Airport Traffic Control Tower
AWP	Western Pacific Region
BUEC	Backup Emergency Communications
COMM	Communications
CONS	Consoles
CONSO	Consolans
CST	Combined Station/Tower
DARC	Direct Access Radar Control
DME	Distance Measuring Equipment
E/G	Engine Generator
FRS	Fixed Radar Search
GS	Glide Slope
HVAC	Heating, Ventilating, and Air-Conditioning
ILS	Instrument Landing System
LDIN	Lead-in Light Facility
MALS	Medium Intensity Approach Lighting System
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MALSF	Medium Intensity Approach Lighting System with Sequenced Flashing Lights
MLS	Microwave Landing System
NAVAIDS	Air Navigation Facility
ODALS	Omnidirectional Approach Lighting System
PAR	Precision Approach Radar
RAIL	Runway Alignment Indicator Light
RAPCON	Radar Approach Control
RATCF	Radar Air Traffic Control Facility
RCAG	Remote Center Air/Ground Communications Facility
REILS	Runway End Identifier Lighting System
RML	Radar Microwave Link
RTR	Remote Transmitter Receiver
RVR	Runway Visual Range
SSALF	Simplified Short Approach Lighting System with Sequenced Flashers
TACAN	Tactical Air Navigation
TML	Television Microwave Link
TO	Technical Officer
TRACAB	Terminal Radar Approach Control in Tower Cab
TRACON	Terminal Radar Approach Control
TVOR	Terminal VHF Omnidirectional Range
VASI	Visual Approach Slope Indicator
VOR	VHF Omnidirectional Range

NOTE: The acronyms listed above represent those frequently used in the ADL. Those acronyms not mentioned shall be provided by the project TO. Acronym reference should be made to the latest edition of FAA Orders 1000.15 (Glossary) and 7340.1 (Contractions).

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NOTE: Maximum Bar Scale Length - 4\" (Details) -- 6\" (Plot Plans) x .3
Minimum Bar Scale Length - 3\" (Details) -- 4\" (Plot Plans) x .2

Figure 1. Bar Scale Size (camera ready copy)

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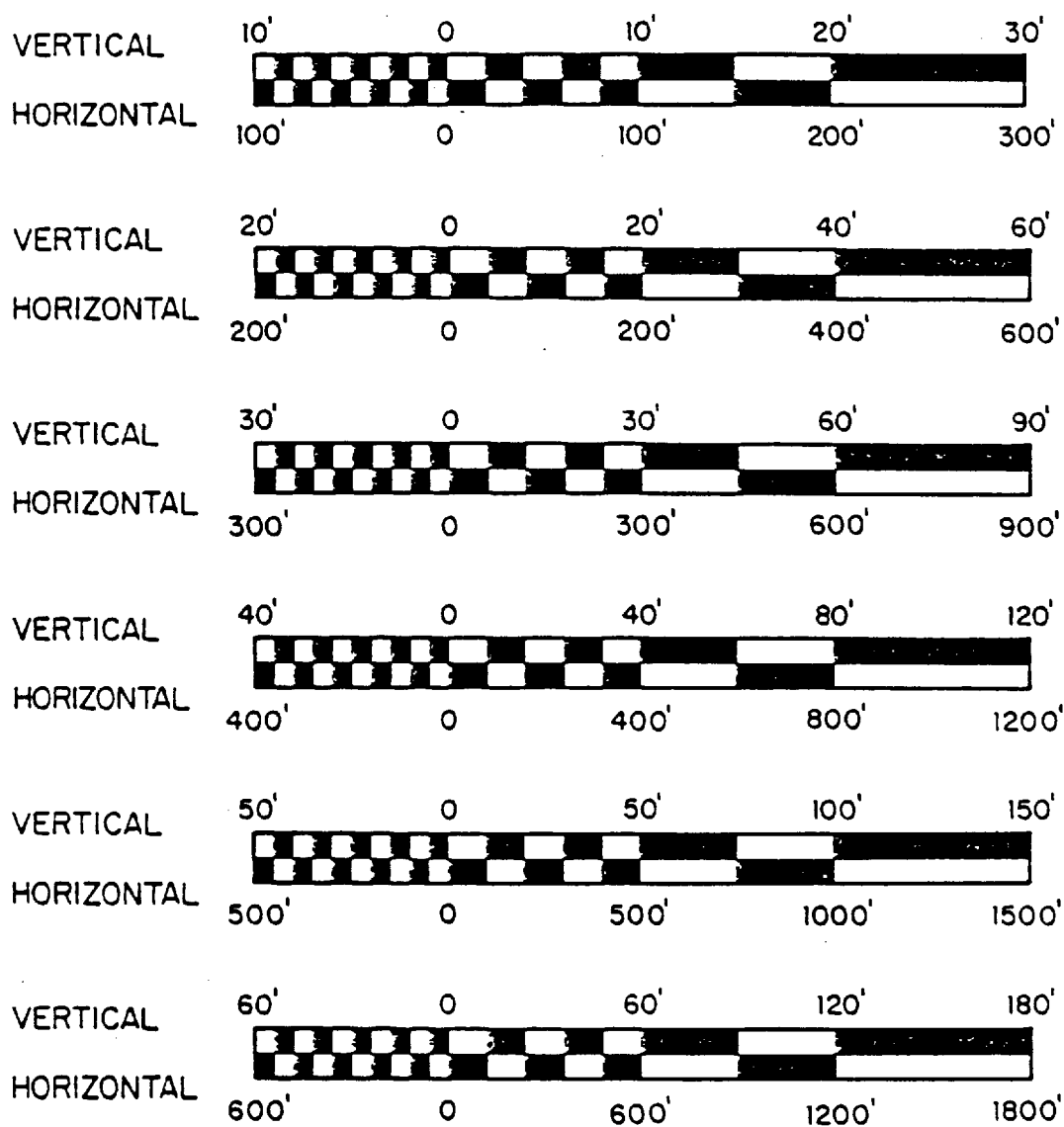


Figure 1a. Bar Scale Size (camera ready copy)

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 <p>US Department of Transportation Federal Aviation Administration</p>		<h1 style="margin: 0;">CONSTRUCTION STANDARDS</h1>				
<table border="0" style="width: 100%;"> <tr> <td style="width: 30%; vertical-align: top;"> <p>Drawing No.</p> <p>- GXX - CXX - AXX - SXX - HXX - EXX</p> </td> <td style="width: 30%; vertical-align: top;"> <p>Drawing Title</p> <p>General (Typical) Civil (Typical) Architectural (Typical) Structural (Typical) Mechanical (Typical) Electrical (Typical)</p> </td> <td style="width: 40%;"></td> </tr> </table>				<p>Drawing No.</p> <p>- GXX - CXX - AXX - SXX - HXX - EXX</p>	<p>Drawing Title</p> <p>General (Typical) Civil (Typical) Architectural (Typical) Structural (Typical) Mechanical (Typical) Electrical (Typical)</p>	
<p>Drawing No.</p> <p>- GXX - CXX - AXX - SXX - HXX - EXX</p>	<p>Drawing Title</p> <p>General (Typical) Civil (Typical) Architectural (Typical) Structural (Typical) Mechanical (Typical) Electrical (Typical)</p>					
<p>REV. LTR. DATE</p>		<p>DESCRIPTION</p>				
<p>CHECKED</p>		<p>APPROVED</p>				
<p>DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION WASHINGTON, D. C. 20591</p>						
<p>ARTCC CONTROL WING EXPANSION AND MODERNIZATION TITLE/INDEX SHEET</p>						
<p>REVISIONS BY</p>		<p>APPROVED BY</p>				
<p>MANAGER, STRUCTURES PROGRAM, APM-500</p>		<p>MANAGER, INTERFACILITY & AIRCRAFT DESIGN, APM-500</p>				
<p>DESIGNED BY</p>		<p>ISSUED BY</p>				
<p>PROGRAM ENGINEERING & MAINTENANCE SERVICE</p>		<p>DATE -</p>				
<p>REVISION NO.</p>		<p>REVISION NO.</p>				

Figure 2. Title/Index Sheet (combined)

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 <p>US Department of Transportation Federal Aviation Administration</p>		<p>CONSTRUCTION STANDARDS</p>	
<p>ARTCC</p> <p>CONTROL WING EXPANSION AND MODERNIZATION</p>			
KEY	DATE	DESCRIPTION	CHECKED APPROVED
<p>DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION <small>WASHINGTON, D. C. 20591</small></p>			
<p>ARTCC CONTROL WING EXPANSION AND MODERNIZATION TITLE SHEET</p>			
APPROVED BY	DESIGNED BY	APPROVED BY	DESIGNED BY
MANAGER, STRUCTURES PROGRAM, JPM-500	MANAGER, INTERFACILITY & AIRCRAFT DIVISION, JPM-500	DATE -	DIVISION NO.
DESIGNED BY	CHECKED BY	PROGRAM ENGINEERING & MAINTENANCE SERVICE	DATE

Figure 3. Title Sheet (separate)

Figure 4. Index Sheet (separate)

Reproduction Art

This page contains camera-ready reproduction artwork. This artwork should be used at the same size shown. Sizes indicated are for size of signature typography. Reductions and enlargements will alter the character of the typography.

For additional pages of reproduction art, contact the DOT Graphics Coordinator.



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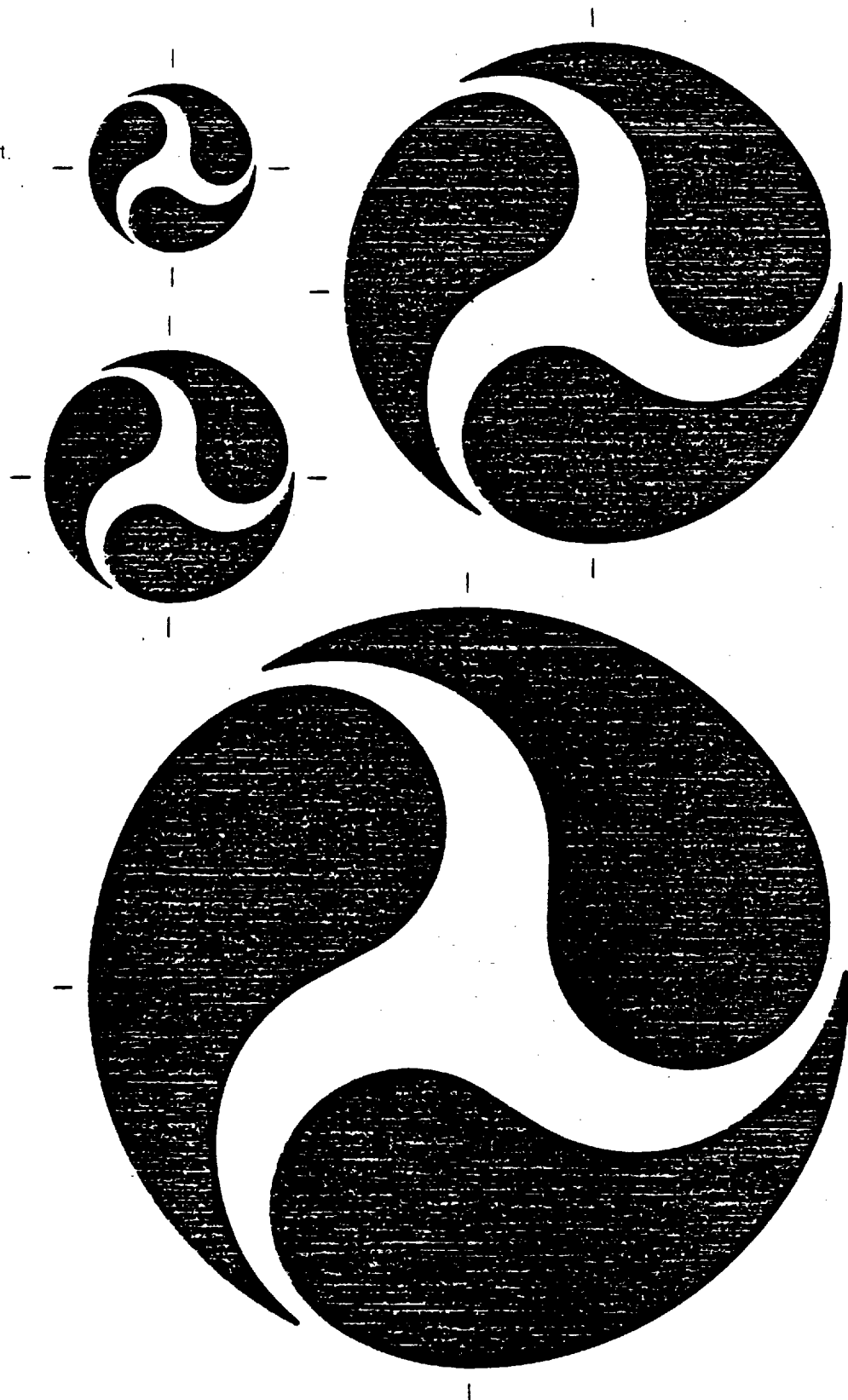
Figure 5. DOT/FAA Mark and Signature (camera ready copy)

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Reproduction Art

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After squaring in-place, trim away the alignment marks.

Figure 5a. DOT/FAA Mark and Signature (camera ready copy)

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REV LTR	DATE	DESCRIPTION	CHECKED	APPROVED
<p align="center">DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION WASHINGTON, D.C. 20591</p>				
REVIEWED BY				
DESIGNED BY		SUBMITTED BY		APPROVED BY
DRAWN BY		ISSUED BY		DATE
CHECKED BY		DRAWING NO.		REV LTR

Figure 6. Title Block, A and B Size Drawing (camera ready copy)

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[illegible]

Figure 7. Title Block, C Size and Larger Drawing (camera ready copy)

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REV LTR	DATE	DESCRIPTION	CHECKED	APPROVED
<p align="center">DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION WASHINGTON, D.C. 20591</p>				
REVIEWED BY		<p align="center">MALSR REMOTE RADIO CONTROL SCHEMATIC WIRING DIAGRAM</p>		
DESIGNED BY		SUBMITTED BY MGR APRCH/LDG BR APM-410	APPROVED BY MGR NAV/LDG DIV APM-400	
DRAWN BY		ISSUED BY	DATE	REV LTR
CHECKED BY			DRAWING NO.	

Figure 8. Title Block, A and B Size Drawing (example)

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[illegible]

Figure 9. Title Block, C Size and Larger Drawing (example)



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Federal Aviation
Administration

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		REPLACED WITH CHANGE BY		
		REVISION C		
B		(PRIOR CHANGE DESCRIPTION)		
A		(PRIOR CHANGE DESCRIPTION)		
REVLTR	DATE	DESCRIPTION	CHECKED	APPROVED
<p align="center">DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION WASHINGTON, D.C. 20591</p>				

Figure 11. Revision Block Entry for Superseded Drawing

C		REPLACES REVISION B WITH CHANGES		
REVLTR	DATE	DESCRIPTION	CHECKED	APPROVED
<p align="center">DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION WASHINGTON, D.C. 20591</p>				

Figure 12. Revision Block Entry for Superseding Drawing

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